Remarks

Claims 22-28, 30, and 32-39 are now pending in this application. Applicants have amended claims 23-28, 30, and 32-37, presented new claims 38 and 39 and cancelled claims 22 and 29 to clarify the present invention. Applicants respectfully request favorable reconsideration of this case.

The Examiner objected to the drawings under 37 C.F.R. § 1.84(h)(5). Applicants submit herewith under separate cover a request to approve drawing corrections and one sheet of replacement drawings including Figs. 4a, 4b and 5. Applicants have labeled the two parts of Fig. 4 and Fig. 4 and Fig. 4b. Applicants have removed the label "prior art" from Fig. 5 since although Fig. 5 shows a delta robot, which was known, the delta robot includes the joints according to the present invention, which were not known prior to the present invention. Accordingly, Applicants respectfully request withdrawal of this objection to the drawings.

The Examiner objected to the drawings under 37 C.F.R. § 1.84(h)(5). Fig. 5 shows a moveable element, the top portion of the delta robot, where the motors are arranged. The moveable element could include a gripper arranged at the end of the linkage structures. Three driving means can include the linkage means as well as motors arranged in the housing. The link device includes the pull arms. Distal and proximal ends of any structure are inherent in the structure. Simply showing the structure necessarily shows the distal and proximal ends. The grooves are shown in Fig. 4b. Applicants respectfully request withdrawal of the objection to the drawings.

The objection to claims 21-28 is no longer relevant since claim 21 is no longer pending. Applicants respectfully request withdrawal of this objection.

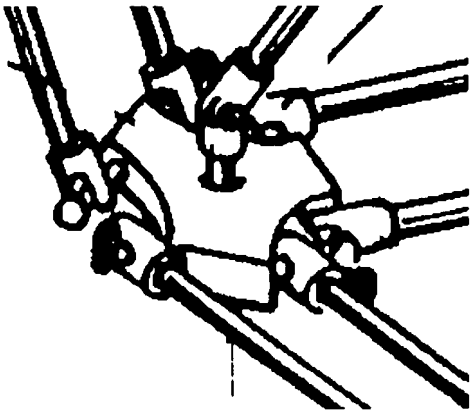
The Examiner rejected claims 21-28 under 35 U.S.C. § 112, first paragraph. As discussed above, Fig. 5 shows and the specification at page 1, lines 12-15 describe three driving means. Therefore, claims 21-28 comply with 35 U.S.C. § 112, first paragraph and applicants respectfully request withdrawal of this rejection.

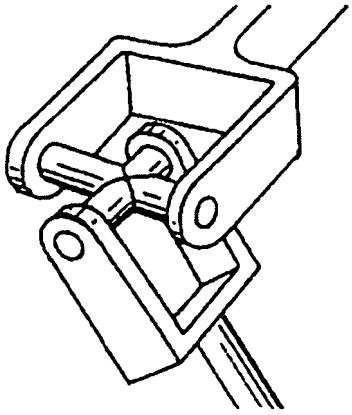
The Examiner rejects claims 21, 23-30, and 32-37 under 35 U.S.C. § 103(a) as being unpatentable over U.S. patent 4,976,582 to Clavel in view of U.S. patent 2,733,085 to Latzen and U.S. patent 4,430,016 to Matsuoka.

The combination of Clavel, Latzen and Matsuoka does not suggest the present invention as recited in claims 21 or 29, since, among other things, the combination does not suggest a joint socket enclosing a joint ball with a space approximately one-half the ball or less. The combination also does not suggest a ball and socket joint that includes a bearing member that engages only a distal half of each joint ball or only a portion of the distal half of each joint ball and only a portion of a proximal half of each joint ball.

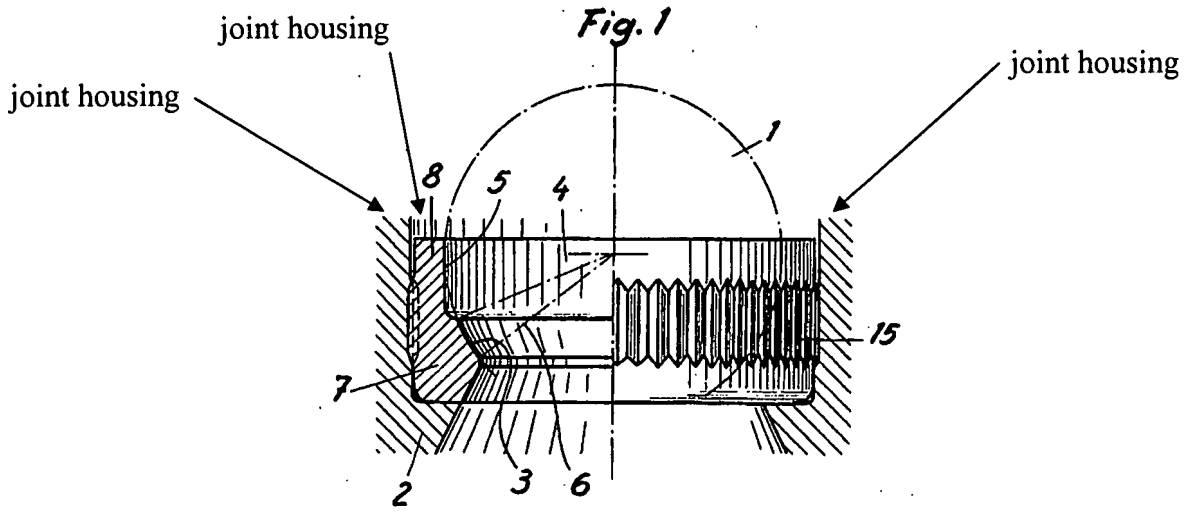
Clavel does not suggest the ball and socket joint according to the present invention. Below are reproduced the joints suggested by Clavel. As can be seen in both of these views, Clavel suggests cardan joints, which are multi-element linkages. Clavel describes these joints as col. 4, lines 13-17. Cardan joints are couplings using a double yoke and four-point center cross.

Cardan joints are used as couplings in the driveshafts of rear-wheel drive cars, but can produce uneven shaft speeds when operat joint angles of more than a few degrees. Cardan joints include many moving parts that result in inherent high friction and complexity in changing any parts. Such a joint does not suggest the ball and socket joint of the present invention.





Latzen suggests joints that virtually completely envelop the ball. One example of such a joint is shown in Fig. 1, which is reproduced below. It is important to recognize that Fig. 1 and the other figures illustrate cut-away views of the joints, as indicated in by the arrows in Fig. 1 as reproduced below, and that the joint housing 2 extends about the entire ball head. Fig. 2 illustrates a similar view and Figs. 3 and 4 illustrate a non-cut away views of the housing almost entirely surrounding the ball.



Such joint housing that surrounds more that approximately one-half of the joint ball is contrary to the present invention as recited in the claims. Including such joints in a robot according to the present invention would severely limit the operation of the robot for a number of reasons. The joints suggested by Latzen would have much higher friction and simply physically limit the movement of the ball and socket relative to each other. Additionally, it would not be remotely easy to replace the bearing member of the joint suggested by Latzen as is possible to replace the bearing member according to the present invention.

In view of the above, Clavel concretely defines and illustrates the joints that are utilized in the robot. It is not apparent how such a joint could be replaced with the limited motion joint suggested by Latzen. Nor is it clear how such a combination suggests the present invention as recited in the pending claims.

Matsuoka et al. similarly suggests a socket structure that entirely surrounds the ball.

The arrangement of the present invention minimizes friction and provides the delta robot with a desired degree of freedom of movement of the delta robot. Additionally, the present invention provides a low weight design that can have a stroke time of about 0.5 sec. The present invention also provides an easily replaceable bearing means that may be exchanged regularly to achieve minimized uneven wear.

The joint socket of the present invention as recited in claims 21 and 29 encloses the joint ball with a space approximately one-half the ball or less. Such a structure permits quick

disassembly of the joint and change of the bearing member. Since the socket structure of both Latzen and Matsuoka et al. surround the ball of the ball and socket joint, not only would the structures not provide the degree of movement possible with the structure according to the present invention, but they would also not provide the possibility to easily disassemble the joint and quickly change the bearing member.

By only enclosing approximately one-half of the ball or less the present invention as recited in claims 21 and 29 provides minimal friction in the joint, which helps to provide the robot with a quick stroke time, which may be on the order of about 0.5 seconds. In spite of only covering approximately one-half of the ball or less, the present invention the bearing member is firmly fixed in the socket of the joint, such that the joint can withstand the rotational and directional movements that such joints encounter in use.

In view of the above, the combination of Clavel, Latzen and Matsuoka does not suggest the present invention as recited in claims 38 or 39 or claims 22-28 and 30-37, which depend therefrom.

Therefore, the references relied upon in the office action, whether considered alone or in combination, do not suggest patentable features of the present invention. Therefore, the references relied upon in the office action, whether considered alone or in combination, do not make the present invention obvious. Accordingly, Applicants respectfully request withdrawal of the rejections based upon the cited references.

In conclusion, Applicants respectfully request favorable reconsideration of this case and early issuance of the Notice of Allowance.

If an interview would advance the prosecution of this case, Applicants urge the Examiner to contact the undersigned at the telephone number listed below.

The undersigned authorizes the Commissioner to charge fee insufficiency and credit overpayment associated with this communication to Deposit Account No. 22-0261.

Respectfully submitted,

Date: 5/29/07

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	:	
Persson et al.	:	Attorney Docket: 43315-212951
Application No.: 09/857,348	:	Art Unit: 3679
Filed: July 24, 2001	:	Examiner: V. Macarthur

For: ROBOT DEVICE

REQUEST TO APPROVE DRAWING CHANGES

Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Sir:

In response to the objection to the drawings in the office action issued November 29, 2006, Applicants submit herewith one sheet of replacement drawings including Figs. 4a, 4b and 5. Applicants have amended the drawings to remove the legend "Prior Art" to Fig. 5. Applicants have labeled the two parts of Fig. 4 and Fig. 4 and Fig. 4b. Applicants have also amended the drawings to provide reference characters for certain elements and amended the specification to include the reference characters. Applicants respectfully request approval of the corrected drawings and withdrawal of the objection to the drawings.

The undersigned authorizes the Commissioner to charge fee insufficiency and credit overpayment associated with this communication to Deposit Account No. 22-0261.

Respectfully submitted,

Date: 5/29/07

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